Ministry of Economic Development
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PCT/NZ2004/000050

CERTIFICATE

This certificate is issued in support of an application for Patent registration in a country outside New Zealand pursuant to the Patents Act 1953 and the Regulations thereunder.

I hereby certify that annexed is a true copy of the Provisional Specification as filed on 14 March 2003 with an application for Letters Patent number 524757 made by NAVMAN NZ LIMITED.

PRIORITY DOCUMENT
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Dated 31 March 2004.

Neville Harris
Commissioner of Patents, Trade Marks and Designs

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524757

atents Form # 4

NEW ZEALAND

Patents Act 1953

PROVISIONAL SPECIFICATION

Title: Radar Installation

We, *NAVMAN NZ LIMITED*,
Nationality: *A New Zealand company*
Address: *13-17 Kawana Street, Northcote, Auckland, New Zealand*,

do hereby declare this invention to be described in the following statement :

Radar Installation

FIELD OF INVENTION

This invention relates a radar head containing the radar transmitter and receiver and to a method controlling the same and of producing the processed output therefrom.

BACKGROUND

Typically a radar consists of at least two parts, a radar transmitter and receiver, which may be combined with an antenna, and a radar signal treatment device which may be combined with the radar display and which may include a facility for adding other signals such as a GPS map.

PRIOR ART

It is known to locate the radar transmitter and receiver remotely from the display unit, and in some cases the separation may be many kilometers (typically in air traffic control or in military systems). In such cases it is normal to provide raw radar information to the remote units and to rely on them to do their own processing.

THE PROBLEM

The problem with this is that it requires the transmission of fairly high bandwidth information to the receivers often at low signal levels. In a shipboard situation it is normal for this bandwidth to be catered for by using a relatively fragile coaxial cable, and to run control cables to the radar receiver and transmitter to control such things as pulse repetition frequency (prf), gain and decluttering. Such long cable runs tend to introduce electrical noise and are mechanically fragile.

OBJECT

It is an object of the invention to provide a radar in which the majority of the processing takes place in the head unit and the feed to any displays is by serial or other digital medium or to at least provide the public with a useful choice.

STATEMENT OF INVENTION

In one aspect the invention consists of a radar head containing a radar transmitter and receiver and closely associated with a radar antenna wherein the head also includes a processing unit for processing the received radar signals and for also combining these with video from other sources, which processing unit can output video data in a digital format for use by at least one digitally driven display unit.

Preferably the processing unit is controllable by digital input signals.

Preferably the processing unit can receive control signals for the radar receiver and transmitter.

Preferably the processing unit can receive digital signal inputs which can be added to the video output during processing.

Preferably the processing unit may output signals representative of more than one video feed.

Preferably all signal processing is carried out digitally.

Preferably the output feed may be utilised by more than a single display unit.

Preferably the radar transmitter is controllable by digital signals from the processing unit.

Preferably the digital signals are to a standard specification.

Preferably the digital signals are USB or Ethernet.

DRAWINGS DESCRIPTION

These and other aspects of this invention, which would be considered as novel in all aspects would become apparent from the following description, which is given by way of example only, with reference to the accompanying drawings in which:

Figure 1 shows a block diagram of the inventive radar system

Figure 2 shows a block diagram of a digital display unit.

Figure 3 shows a block diagram of the video processing unit

Figure 1 shows a radar antenna 10 which is fed from a transmitter 11 and feeds a receiver 12. Output from the receiver is supplied to video processor 16 which also receives input from GPS receiver 14 fed from antenna 13. The GPS may also contain an electronic map or chart 15. Not shown are also other inputs for, for example, range rings and vehicle heading line. Inputs such as these may be remotely located from the video processor and may link to it as multiplexed inputs in the same manner as the control inputs do. The GPS output, for instance may actually be mutiplexed into the processor via a standard bus.

The video processor feeds signals to, and is fed by, multiplexer 17, the multiplexer output being encoded in a standard digital signal protocol, for instance USB or Ethernet over cable, optical cable or wireless. The video processor may produce more than one video feed, for instance it might produce both a raw and a moving target processed radar signal, and both may be encoded into the output.

Figure 2 shows a block diagram of a video display unit which consists of a standard monitor 20 fed by video driver 21 from multiplexer 23. The display unit may itself combine separate video feeds for some of the displayable items. This particularly applies to range rings, where users tend to be extremely idiosyncratic in their preferences and forcing multiple displays to show the same range rings at the same video level may cause user dissatisfaction. The multiplexer also receives input from radar control unit 22 which allows remote control of such things as radar gain, display range, etc. Where the digital output of video processor 16 contains more than one video feed there may be local control of which is shown, or the balance between those which are shown.

The controls may be knob and button or they may be roller ball and button or they may be presented on a touch sensitive screen.

Since the radar video is distributed digitally there may be many displays on the same feed. Not all displays may have access to the remote radar control functions, which may be available to privileged users only on input of a password.

Figure 3 shows the video processor block diagram where the video output from the radar receiver is processed at 30 for decluttering, addition of range rings, etc and then passed to vector to raster mapping processor 31 and fed into memory map 33.

In similar manner the map input from GPS 32 is also fed into the memory map at the required scale. While the GPS is shown as directly connected to the video processor it may actually be remotely located and may feed the video processor via the same digital bus which carries the output signals.

The memory map is intended to cover a display screen at the maximum required resolution. Output from the radar receiver, synchronised with the antenna movement, is vector mapped into the memory at the radar prf rate. Output from the GPS unit map is also mapped into the memory, preferably at a lower rate. This rate may be at one of the standard protocols, for instance NMEA. Similarly other video items may be written into memory, for instance information relating to the vehicle heading and speed.

The video processor may be remotely controlled for the brilliance mix between map and radar returns or other items making up the video, and it may translate remote commands into control for the radar receiver and transmitter, for instance of gain, prf or output power.

Output from the memory array is multiplexed onto an output stream in a known manner, and various parts of the output stream may be differently coloured, either to indicate their function or the signal strength or type.

VARIATIONS

While the video processing is described as using a bitmapped memory mapped image transfer the image may be stored as a vector image and passed to the displays in this format.

The image transfer process may transfer only those portions of the image screen which have changed to give reduced bandwidth requirements. Since the entire screen may be refreshed at the radar rotation rate this will determine the bandwidth requirements.

Pipers

Attorneys for :

Navman NZ Limited

ABSTRACT

In a radar processing of the radar video, and preferably most video inserts such as maps or charts, are carried out at the head end of the radar and the video output conveyed to a monitor over a standard digital channel. Remote control of the radar and video processing functions may be carried out over the same channel.

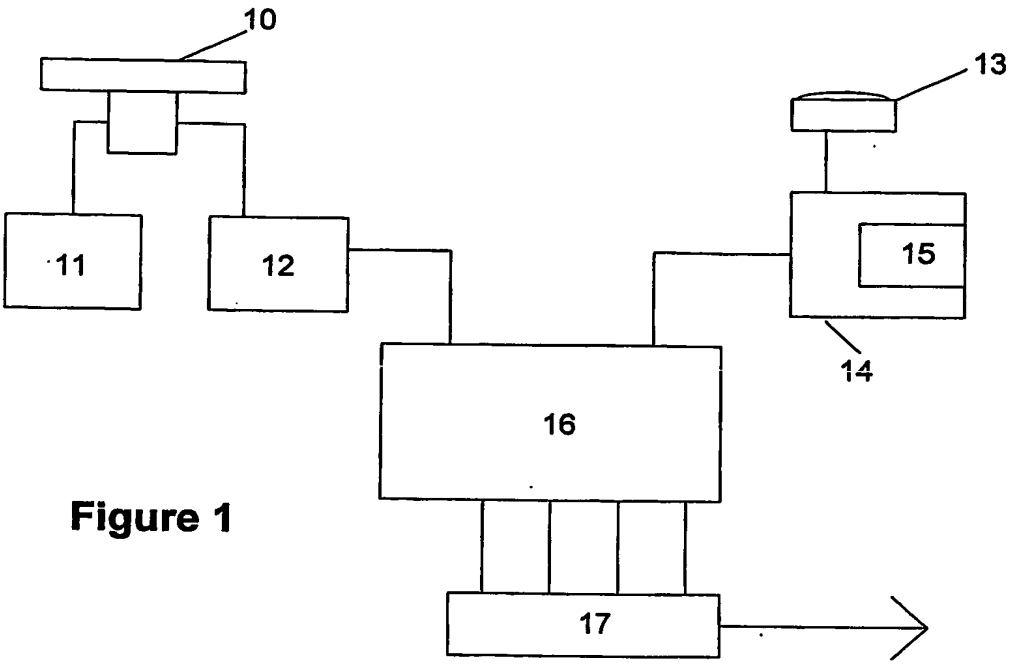

Figure 1

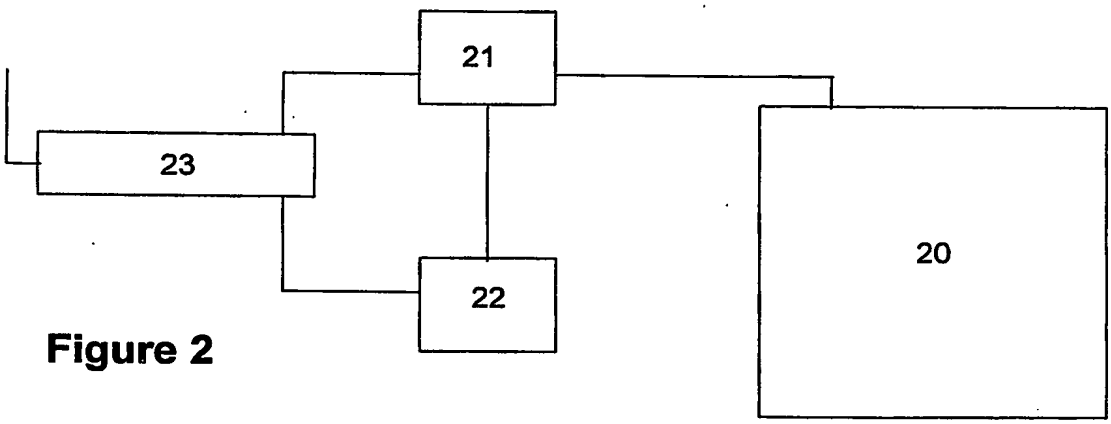

Figure 2

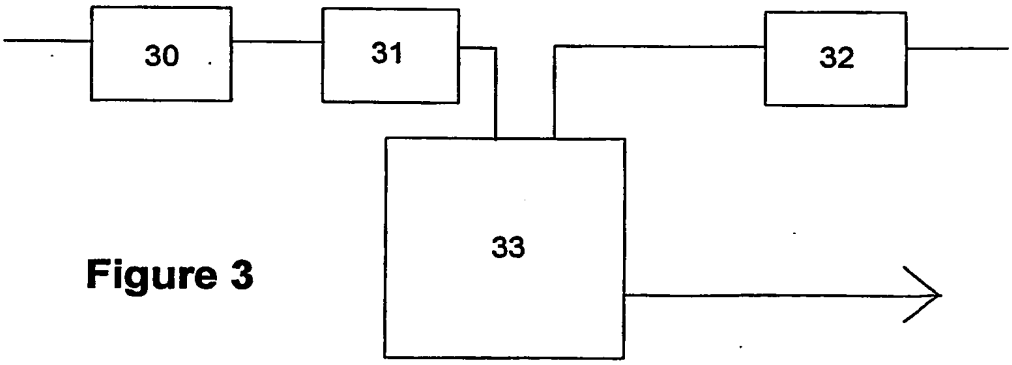

Figure 3